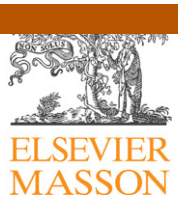
Archives of Cardiovascular Disease (2009) **102**, 351—359



ABSTRACTS OF THE 18TH CONGRESS OF ECHOCARDIOGRAPHY

Poster session, Thursday afternoon, 28 May

Valvular heart disease

32

Durability of supra-annular, stentless pericardial aortic valve prostheses and their impact on left ventricular remodelling in the mid-term

E. Pektok[a], H. Müller[b], S.K. Celik[c], S. Jorge[a], K. Mustafa[c], A. Murat[c], B. Serdar[c], C. Mustafa[a], Y. Hasan[c], C. Atilla[c], K. Afksendiyos[a], O. Mustafa[c]
[a] *Division of Cardiovascular Surgery, University Hospital of Geneva, Geneva, Switzerland*; [b] *Division of Cardiology, University Hospital of Geneva, Geneva, Switzerland*; [c] *Division of Cardiovascular Surgery, Atakalp Heart Center, Izmir, Turkey*

Objectives.— New generation supra-annular stentless pericardial valves (Freedom Solo®, Sorin Biomedica, Italy) require a single suture line, thus facilitate implantation. In this retrospective cohort analysis, we report the LV remodelling, hemodynamic performance and durability of such valves up to 3 years after implantation.
Methods.— Ninety-six consecutive patients (age: 64.7 ± 22.1 years; 56 males) had an AVR with a Freedom Solo® bioprosthesis due to aortic stenosis and/or insufficiency in two centers. Pre- and perioperative data were obtained from chart review and all patients underwent clinical and echocardiographic evaluation for the purpose of the study. Valvular function, LV size and function were analyzed.
Results.— Etiology was senile degeneration, rheumatic valvulopathy, infective endocarditis and fibroelastoma in 80, 13, 2 and 1 patients respectively. Hospital mortality was 8.3% ($n = 8$). During a mean follow-up of the survivors ($n = 88$) of 16.9 ± 7.0 months, there were 3 late deaths due to non-valve related causes and no reoperations. At follow-up, TTE revealed paravalvular leaks in 4 patients (2 mild, 2 moderate), moderate stenosis in 3 patients and no significant central regurgitation. Transvalvular gradients in the follow-up were significantly less than preoperative gradients. LVEDD, LVESD, and LV mass index were also significantly diminished in the follow-up. Mean transvalvular gradients in the follow-up were 10.9 ± 5.8, 10.4 ± 4.0, 8.2 ± 3.8 and 6.8 ± 1.7 for 21-, 23-, 25- and 27-mm valves respectively.
Conclusions.— The Freedom Solo® valve showed acceptable hemodynamic performance in the mid-term, even if a small percentage (4%) had significant prosthesis dysfunction. It also positively affects LV remodelling. However, further evaluation is necessary to assess the durability and hemodynamic performance of such valves in the long-term and in comparison to other stentless valves.

33

Growth of a myxoma on a mechanical mitral valve

T. Rolf[a], P. Tozzi[a], X. Jeanrenaud[b], A. Kaçar[c], L.K. von Segesser[a]
[a] *Chirurgie cardiovasculaire, CHUV, Lausanne, Switzerland*; [b] *cardiologie, CHUV, Lausanne, Switzerland*; [c] *pathologie, CHUV, Lausanne, Switzerland*

Goals.— Left atrial myxoma on the annulus of a mechanical valve has never been reported in literature. We report on our experience on this cardiac tumor associated to a prosthetic heart valve. Our aim was to define parameters for the differentiation of other proliferative diseases in respect of echocardiographic parameters.
Materials and methods.— A 74-year-old female was admitted to hospital in June 2008 after an increase of an intracardiac tumor mass found in a control echocardiography in April 2008 after a cerebral stroke. The patient had a mechanical valve implanted in mitral position six years earlier. A transesophageal echocardiography was performed in order to eliminate the possibility of a thrombus despite of adequate anticoagulation.
Results.— The transesophageal echocardiography demonstrated a mobile hypoechogenic mass attached to the anterior annulus of the prosthesis. Despite of adequate anticoagulation, another control two months later demonstrated the persistence of the mass without modification. The presence of a myxoma was suspected. The pathologic-anatomical examination showed the typical pattern of the myxoma tumor entity.
Conclusion.— We could speculate that the annulus of the prosthetic valve could represent a chronic inflammatory stimulus rarely ending up in a cardiac tumor. Echocardiography is an excellent method to detect intracavity masses but its quality differs due to the size and movement of the structure and its localization.

T34

Specificity of left ventricular response to exercise in patients with asymptomatic valvular aortic stenosis

E. Donal[a], P. Lancellotti[b], A. Bernard[a], C. Thebault[a], L. Piérard[b]
[a] *CHU de Rennes, Rennes, France*; [b] *CHU de Liège, Liège, Belgium*

Objective.— To determine whether left ventricular systolic and/or diastolic functions during an exercise stress echocardiography can identify early left ventricular (LV) dysfunction in asymptomatic patients with severe aortic stenosis (AoS).
Methods.— A bicentric case—control study was performed about 207 patients with AoS, without symptoms, a peak aortic valve velocity 3 m/s and LV ejection fraction (EF) > 50% and 43 aged-matched normal controls. An echocardiogram was performed at rest and dur-

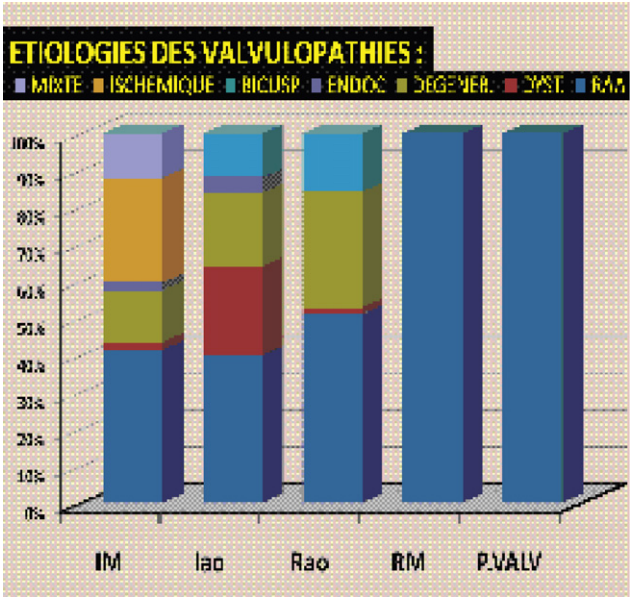
1875-2136/$ — see front matter
doi:10.1016/j.acvd.2009.03.002

ing a standardized exercise stress test. Tissue Doppler, 2D-strain as well as conventional echocardiography was identically performed for every patients at rest and at 120 ± 10/min.
Results.— For patients with AoS, mean (S.D.) aortic valve area was 0.87 (0.19) cm^2. At rest, LVEF was similar for patients with AoS and controls, respectively (65.6 [9.1] vs 63.3 [6.6])%, $p = 0.1$). However, S' (tissue Doppler systolic peak) (6.2 [2.3] vs 7.7 [1.2] cm/s, $p < 0.001$) and the increase in S' during exercise (7.5 [2.6] vs 11.6 [1.3] cm/s, $p < 0.001$) were lower in patients with AoS. The difference was even greater considering global longitudinal systolic strain (GLS) at rest (− 15.4 [4.0] vs − 20.2 [2.7]) and during exercise (− 16.5 [4.9] vs − 24.6 [3.5]). The best discriminant parameter between the 2-populations was the exercise GLS with a cut-off of − 21.9 providing 83.7% specificity and 89.8% sensitivity.
Conclusion.— In patients with similar LVEF, LV longitudinal deformation measured by 2D-S is providing, during the exercise, a clinically relevant tool to distinguish subclinical LV dysfunction induced by the chronic overload due to severe AoS.

20

Profil clinique et échocardiographique des valvulopathies d'un service de cardiologie algérois

Objectif.— L'objectif est de décrire les anomalies valvulaires dans une série consécutive des patients vus en hôpital du jour.
Méthode.— De 2005 à 2007, 318 patients valvulaires d'âge moyen 48 ± 15 ans dont 171 femmes (53 %) et 147 hommes ont été examinés de façon prospective et leurs données cliniques, biologiques, radiographiques, électrocardiographiques et échocardiographiques ont été analysées.
Résultats.— Données étiologiques : le RAA concerne 214 patients (67.27 %) ; l'étiologie dystrophique ou dégénérative 40 % des patients porteurs d'une IA, 30 % des patients porteurs d'un RAO et 15 % des porteurs d'une IM. L'étiologie ischémique a été retrouvée chez 25 % patients porteurs d'une IM. Dix pour cent des valvulopathie aortiques sont d'origine congénitale.
Cent quatre-vingt-neuf patients (59 %) ont été retenus pour une indication opératoire dont : 53 (28 %) pour RM ; 25 (13 %) pour IM ; 23 (12 %) pour Rao ; 7 (4 %) ; 81 (43 %) pour polyvalvulopathie.
Conclusion.— Notre étude montre que les valvulopathies rhumatismales demeurent la principale cause des valvulopathies en Algérie malgré l'émergence d'autres étiologies. De même, l'âge moyen de nos patients montre que la valve mécanique est l'indication de choix quand un remplacement valvulaire est indiqué.



21

Évaluation du *speckle tracking* chez des patients avec insuffisance mitrale grave, symptomatiques, avec fraction d'éjection préservée — étude initiale

D. Le Bihan, D. De Moraes Guerra, V. Fontes, R.B. De Mattos Barretto, D. Della Togna, M. Hassan Saleh, M. Maldonado, J.-E. Assef, A. Guerra De Moraes Rego Sousa, L.S. Piegas
Instituto Dante Pazzanese de Cardiologia, SAO Paulo, Brésil

Introduction.— Récemment, de nouvelles techniques écocardiographiques ont été réalisées pour évaluer la fonction ventriculaire gauche (FVG), tels que le *speckle tracking* (ST), qui mesure le pourcentage de difformité du myocarde. L'insuffisance mitrale chronique (IM) est une pathologie où c'est difficile d'évaluer FVG. Le ST, dans le futur, pourra contribuer dans ce sens.
Objectifs.— (1) Évaluer le comportement du ST sur 14 patients avec IM grave, symptomatiques, avec fraction d'éjection ventriculaire gauche préservée. (2) Le corrélationer avec les mesures quantitatives (surface de l'orifice régurgitant — SOR et volume régurgitant — VR) et semi-quantitatives (le diamètre du jet régurgitant à son origine — vena contracta — VC) utilisées pour déterminer la gravité de IM. (3) Comparer le ST de ce groupe avec 18 individus normaux.
Méthodes.— Des mesures linéaires et volumétriques de l'atrio et ventricule gauches ont été effectuées, en plus des mesures du SOR, VR et VC. On a mesuré le ST longitudinal et radial moyens en un modèle de 16 segments myocardiques chez les deux groupes.
Résultats.— Il n'y a pas eu de différence significative entre le ST des patients avec IM et les individus normaux. Toutefois, il y a eu une relation inverse significative entre le SOR et le ST radial ($R^2 = 0,39$; $p = 0,02$). Quand on a analysé 6 patients avec SOR > 0,75 cm^2 et VR > 115 ml, en les comparant au reste du group avec IM, on a observé la réduction du ST radial, respectivement : 29 ± 10 % vs. 49 ± 9 % ; $p < 0,01$ et 28 ± 11 % vs. 46 ± 11 % ; $p = 0,02$.
Conclusion.— Chez des patients avec IM grave, symptomatiques, avec fraction d'éjection préservée, l'augmentation de la gravité de la régurgitation s'associe à la plus petite contraction radiale, évaluée à travers le ST.

22

Patients with paradoxical low-flow, low-gradient aortic stenosis despite preserved ejection fraction have intrinsic impairment of LV myocardial function: a speckle-tracking imaging study

C. Mielot, F. Cransac, N. Resseguier, R. Giorgi, F. Thuny, S. Renard, J.-F. Avierinos, S. Ansaldi, L. Tafanelli, G. Habib
La-Timone, Marseille, France

Introduction.— Paradoxical low-flow, low-gradient aortic stenosis despite preserved ejection fraction (PLFAS) is a recently described entity and has been related to chronic high level of left ventricular (LV) afterload and to intrinsic impairment of LV myocardial function. However, the exact role of this latter is unknown and has never been evaluated by new echotechniques.
Purpose.— To assess LV function using both conventional echoparameters and speckle-tracking imaging (2D strain) in patients with PLFAS.
Methods.— One hundred and twenty patients with severe aortic stenosis (indexed valve area = 0.6 cm^2/m^2) with preserved LV function (LVEF = 50%) underwent a comprehensive echocardiographic study including 2D strain. Patients were separated into 2 groups: group 1: 35 pts (30%) with low-flow defined by a stroke volume index (SVI) = 35 ml/m^2 (PLFAS group), group 2: 85 pts (70%) with normal flow aortic stenosis defined by a SVI > 35 ml/m^2.
Results.— As compared with group 2 pts, pts with PLFAS are older (78 ± 9 vs 73 ± 10 years, $p = 0.005$), have higher BNP levels (489 ± 625 vs 252 ± 287 ng/l, $p = 0.007$), lower transvalvular

gradient (46 ± 20 vs 57 ± 16 mmHg, $p < 0.001$), smaller valve area (0.34 ± 0.1 vs 0.43 ± 0.7 cm^2/m^2, $p < 0.001$), smaller LV diastolic volume (62 ± 20 vs 75 ± 20 ml/m^2, $p < 0.001$), lower LVEF (62 ± 9 vs 66 ± 8%, $p = 0.01$) and higher valvulo-arterial impedance (Zva) (5.6 ± 1.2 vs 3.9 ± 0.7 mmHg/ml/m^2, $p < 0.001$).
Global longitudinal strain (-13 ± 4 vs -15 ± 4%, $p = 0.007$), radial strain (25 ± 12 vs 37 ± 17%, $p < 0.001$) and circumferential strain (-17 ± 5 vs -21 ± 6%, $p < 0.001$) were lower in group 1.
By multivariate analysis, only Zva was significantly associated with a SVI = 35 ml/m^2.
Conclusions.— In addition to elevated LV afterload, patients with PLFAS have impaired intrinsic LV myocardial function evidenced by speckle-tracking imaging.

23

Aortic valve calcification measured by multislices computed tomography in aortic stenosis — correlation with hemodynamic severity and clinical implication for patients with low ejection fraction

C. Cueff De Monchy, J.-M. Serfaty, C. Cimadevilla, L. Lepage, D. Detaint, E. Brochet, J.-P. Laissy, D. Himbert, B. Iung, A. Vahanian, D. Messika-Zeitoun
Hôpital Bichat—Claude-Bernard, Paris, France

Background.— Aortic valvular calcification (AVC) is the leading process to aortic stenosis (AS) and can be accurately measured using computed tomography (CT). However, thresholds of AVC for the diagnosis or exclusion of severe AS using multislices CT (MSCT) remained unclear and whether degree of AVC could be helpful for the evaluation of AS severity in patients with reduced ejection fraction (EF) had never been evaluated.
Methods.— One hundred and sixty-one patients with a wide range of AS severity, enrolled in 2 ongoing prospective studies, underwent within one month a transthoracic echocardiography and a MSCT. Hemodynamic severity of AS was based on the aortic valve area (AVAi = 0.6 cm^2/m^2) and mean gradient (MG = 40 mmHg). Degree of AVC (calcium scoring) measured using MSCT was expressed in arbitrary units (Agatston Units [AU]). Our population was divided into 2 subsets. Validation set: in 140 patients with EF > 40%, we evaluated the relationship between hemodynamic severity and AVC. Testing set: in 21 patients with reduced EF (= 40%), we evaluated the accuracy of AVC thresholds defined in the validation set for the diagnosis of severe AS.
Results.— Validation set: mean EF was 61 ± 6%, AVAi 0.66 ± 0.24 cm^2/m^2 [0.2—1.3] and AVC score 1926 ± 1687 AU [42—8376]. AS was severe in 63 patients (45%) and non-severe in 77 (55%). Association between AVC and AVAi was curvilinear ($r = 0.66$, $P < 0.0001$) and a score = 1651 AU provided 79% sensitivity and 86% specificity for diagnosis of severe AS. A threshold of 700 AU provided a high sensitivity (98%) and negative predictive value (NPV = 97%) whereas a threshold of 2000 AU provided a high specificity (94%) and good positive predictive value (PPV = 89%). Testing set: mean EF was 29 ± 9%, AVAi 0.46 ± 0.15 cm^2/m^2 [0.2—0.7] and AVC score 3268 ± 1930 AU [491—7120]. Among these 21 patients, 8 had a low-gradient/low-output (AVAi = 0.6 cm^2/m^2 and MG < 40 mmHg). Based on MG, stress echocardiography and surgical findings, 5 patients had a non-severe AS and 16 a severe AS. All but one was correctly classified using the threshold of 1651 AU (93% sensitivity, 100% specificity, 100% VPP and 83% VPN). Only one patient with a severe AS (AVAi = 0.53 cm^2/m^2) and a borderline AVC score (1436 AU) was misclassified.
Conclusions.— In this large series of patients with a wide range of AS, we show that hemodynamic severity and AVC are strongly correlated and we provide useful thresholds for the evaluation of AS severity for difficult cases in routine practice, especially in patients with depressed EF.

24

Usefulness of the right parasternal view and the cristal probe for the evaluation of the severity of aortic stenosis in the modern area — the COFRASA study

C. Cueff De Monchy, L. Lepage, I. Boutron, M. Leye, D. Detaint, E. Brochet, B. Iung, A. Vahanian, D. Messika-Zeitoun
Hôpital Bichat—Claude-Bernard, Paris, France

Background.— Evaluation of the severity of the aortic stenosis (AS) is based on echocardiographic assessment of the mean transaortic gradient (MG) by continuous-wave Doppler and calculation of the aortic valve area (AVA) using the continuity equation. Pioneering echocardiographic studies have shown that MG should be measured in the apical and right parasternal views using a crystal or pedof probe (PP). Nowadays, ultrasound systems are often sold without a CP due, at least partially, to the improvement of combined Doppler and two-dimensional or steerable transducers (ST). Whether this evolution translated into misevaluation of AS severity was uncertain. Our aim was to evaluate the additional diagnostic value of the use of PP and the right parasternal view for the evaluation of AS severity in the modern area.
Methods.— We prospectively evaluated MG and AVA using the ST (apical view) and the PP (right parasternal view) in 100 patients (78 ± 5 years, 65% male) consecutively enrolled in an ongoing prospective study (COFRASA). AS severity was graded as mild (AVA > 1.5 cm^2), moderate (1—1.5 cm^2) or severe (AVA < 1 cm^2). Misclassification was defined as at least a one grade difference between the two views and an AVA difference > 0.15 cm^2 (twice the intraobserver variability).
Results.— Feasibility of the ST and apical view was 100%, MG 20 ± 13 mmHg and AVA 1.52 ± 0.45 cm^2. Fifty-three percent had a mild AS, 34% a moderate AS, and 13% a severe AS. Using the PP (right parasternal view), feasibility was 85%, MG 25 ± 16 mmHg, AVA 1.33 ± 0.41 cm^2 (both $p < 0.005$ compared to the ST). Thirty-five percent ($n = 30$) had a mild AS, 46% ($n = 39$) a moderate AS, and 19% ($n = 16$) a severe AS. Using only the ST and the apical view, 21 patients (21%) would have been misclassified: 17 as mild instead of moderate AS and 3 as moderate instead of severe AS. In those misclassified patients, MG was 9 ± 6 mmHg higher with the PP and 33% had a MG difference > 10 mmHg.
Conclusion.— Use of the crystal probe and the right parasternal view must remain performed for the evaluation of AS severity, especially in case of discrepancy between symptoms and AS severity or for precise evaluation of AS progression.

25

Size-adjusted left ventricular outflow tract diameter reference values — a safeguard for the evaluation of the severity of aortic stenosis

M. Leye, E. Brochet, L. Lepage, C. Cueff De Monchy, I. Boutron, D. Detaint, F. Hyafil, B. Iung, A. Vahanian, D. Messika-Zeitoun
Hôpital Bichat—Claude-Bernard, Paris, France

Objectives.— We sought to evaluate the relationship between left ventricular outflow tract diameter (LVOTd), gender and body surface area (BSA) and to evaluate the usefulness of size-adjusted LVOTd reference values in patients with aortic stenosis (AS).
Background.— AS grading is based on the echocardiographic calculation of the aortic valve area (AVA) and requires LVOTd measurements, one main potential source of error. Transesophageal (TEE) is reputed to be more accurate than transthoracic echocardiography (TTE) but validation studies are rare. A safeguard for LVOTd measurements is thus desirable.
Methods.— Since January 2006, 3 subsets of patients were prospectively and concurrently enrolled: (1) TEE group, in 120 patients with

and without AS, we prospectively measured LVOTd during both TTE and TEE; (2) validation set, in 382 patients without aortic valve or ascending aorta diseases, we evaluated the relationship between LVOTd, gender and BSA; (3) testing set, in 173 patients with AS, we compared the AVA obtained using measured LVOTd (AVAMEAS) and using calculated LVOTd derived from a regression determined in the validation set (AVACALC).
Results.— TTE did not differ from and correlated well with TEE measurements overall (23Â ± 2 vs. 23Â ± 2 mm, $p = 0.26$; $r = 0.95$, $p < 0.0001$) and in patients with AS ($n = 43$) (24Â ± 2 vs. 24Â ± 3 mm, $p = 0.15$; $r = 0.92$, $p < 0.0001$). LVOTd was linearly correlated to BSA independently of gender (LVOTd = 5.7 *BSA + 12.1; $r = 0.55$, $p < 0.0001$). In the testing set, AVACALC did not differ from and correlated well with AVAMEAS (1.20Â ± 0.42 cm^2 vs. 1.23Â ± 0.40 cm^2, $p = 0.08$; $r = 0.89$, $p < 0.0001$).
Conclusions.— TTE and TEE measurements of the LVOTd provided similar results. LVOTd was significantly associated to BSA and LVOTd derived from a linear regression linked to BSA independently of gender provided an acceptable approximation of the AVA. Thus, if LVOTd must remains a crucial part of the echocardiographic evaluation of AS severity, the present equation may be used as a safeguard when this measurement is difficult or not possible using TTE.

35

Intérêt de l'échographie transœsophagienne perprocédure lors de l'implantation d'une valve aortique transcutanée

M. Bernard, C. Nafeh-Bizet, A. Troniou, H. Eltchaninoff, C. Tron, A. Cribier, P.-Y. Litzler, J.-P. Bessou, F. Bauer
CHU Charles-Nicolle, Rouen, France

Rationnel.— Le but de notre étude est d'évaluer l'intérêt de l'échographie transœsophagienne en salle d'implantation de valve aortique percutanée.
Méthodes.— Quinze patients inclus dans l'étude Partner ont bénéficié d'une échographie transœsophagienne (GE Vivid 7 et Philips IE 33) au cours d'une procédure de remplacement valvulaire aortique transcutané par voie trans-apicale. Les acquisitions ETO comportaient les coupes usuelles permettant l'étude des rapports anatomiques de la prothèse, sa position et la détection de fuite para ou centro-prothétique.
Résultats.— Sur les 15 examens, il y a eu 6 déploiements inappropriés mis en évidence uniquement par l'échographie transœsophagienne. Deux se sont traduits par un état de choc (1 migration de prothèse et 1 anomalie du jeu valvulaire) alors que les 4 autres n'ont pas eu de retentissement clinique (2 fuites paraprothètiques et 2 déploiements insuffisants de la prothèse). À l'exception de la migration de prothèse, une sur-inflation a permis de corriger les anomalies.
Conclusion.— L'échographie transœsophagienne met en évidence les anomalies de déploiement des valves et permet de proposer une mesure corrective dans 32 % des cas.

26

LV filling pressure is a major determinant of the presence and severity of functional mitral regurgitation in patients with reduced or preserved LV ejection fraction

S. Maréchaux[a], C. Pinã§on[b], M. Poueymidanette[a], V. Matthieu[a], A. Bellouin[a], G. Deklunder[a], T. Le Tourneau[a], R. Neviäre[a], P. Asseman[a], T. Le Jemtel[c], P. Pibarot[d], P.-V. Ennezat[a]
[a] *Hôpital cardiologique, CHRU de Lille, Lille, France ;* [b] *faculté de pharmacie, Lille, France ;* [c] *Tulane medical school of medicine, New Orleans, United States ;* [d] *centre de recherche sur les valvulopathies, hôpital Laval, Laval, Canada*

Background and objective.— Functional mitral regurgitation (MR) may occur not only in patients with reduced LV ejection fraction (LVEF) but also in those with preserved LVEF. The aim of the study was to assess the determinants of functional MR in patients with preserved and reduced LVEF.
Methods.— Ninety-five patients with functional MR who had a comprehensive Doppler-echocardiographic assessment of LV remodelling and function, MR severity, and LV filling pressure were enrolled in this study. Ninety-seven patients without functional MR who had a Doppler echocardiographic examination during the same period were also included in the study.
Results.— Thirty-two percent of patients with functional MR had a preserved LVEF. Higher ratio of mitral flow E velocity to mitral annulus diastolic e' velocity and larger systolic mitral valvular tenting emerged as independent predictors of the presence of MR in both patients with preserved and reduced LVEF. The independent predictors of MR severity measured by the effective regurgitant orifice area were: increased E/e' ratio ($P = 0.004$), larger mitral tenting area ($P = 0.0045$) and reduced lateral mitral annulus systolic velocity ($P = 0.014$) in patients with preserved LVEF and larger mitral tenting area ($P = 0.05$), intra-LV dyssynchrony ($P = 0.04$), and lower diastolic LV sphericity index ($P = 0.04$) in those with reduced LVEF. The systolic valvular tenting area was directly and independently related to: longer papillary muscles separation distance and higher E/e' ratio in patients with preserved LVEF and to longer anterior papillary muscle ($P = 0.05$) and posterior papillary muscle intervalvular fibrosa distance lengths ($P < 0.0001$), and higher E/e' ratio ($P = 0.0435$) in patients with reduced LVEF.
Conclusion.— Functional MR can be encountered in patients with preserved LVEF. In these patients as well as in those with reduced LVEF, the systolic mitral valvular tenting that leads to functional MR is determined not only by mitral tethering forces, i.e., displacement of papillary muscles but also by pushing forces, i.e., increased left atrial pressure. This study underscores that LV preload is a key determinant of functional MR in both patients with preserved and reduced LVEF. These results may have important implications with regard to the evaluation and treatment of functional MR.

27

Impact of left atrial volume on clinical outcome in organic mitral regurgitation

T. Le Tourneau[a], D. Messika-Zeitoun[b], A. Russo[c], D. Detaint[b], Y. Topilsy[d], D. Mahoney[d], R. Suri[d], M. Enriquez-Sarano[e]
[a] *University Hospital, Lille, France;* [b] *Bichat Hospital, Paris, France;* [c] *University Hospital, Bologne, Italy;* [d] *Mayo Clinic, Rochester, United States;* [e] *Mayo Clinic, Rochester, United States*

Background.— Left atrial (LA) enlargement is a consequence of organic mitral regurgitation (MR) but its association with clinical outcome independently of MR severity is uncertain.
Methods and results.— Four hundred and ninety-two patients (63 ± 15 years, 60% males) in sinus rhythm with organic MR (regurgitant volume 68 ± 42 ml/beat) were prospectively enrolled with triple echocardiographic quantitation performed at baseline (MR severity, LA volume and left ventricular characteristics) and their outcome with medical and surgical management analyzed. LA volume indexed to body surface area (LA-index) was 55 ± 26 ml/m^2 (< 40 ml/m^2 in 158, 40—59 ml/m^2 in 160 and = 60 ml/m^2 in 174 patients). Under medical management, 5-year survival was 80 ± 2.9% and cardiac events 28 ± 3%. Adjusting for established predictors of outcome, LA-index was independently associated with survival after diagnosis (1.3[1.1—1.5] per 10 ml/m^2 increment, $P = 0.001$).
Patients.— With a LA-index = 60 ml/m^2 had lower 5-year survival than those with no or mild LA enlargement ($P < 0.0001$) and than survival expected in US population (53 ± 8.6% versus 76%, $P = 0.017$). Compared to patients with LA-index < 40 ml/m^2, those with LA-

index = 60 ml/m^2 had increased mortality (2.8 [1.2—6.5], $P = 0.016$) and cardiac events (5.2 [2.6—10.9], $P < 0.0001$) with medical management. Mitral surgery was associated with decreased mortality (0.46 [0.26—0.84], $P = 0.01$) and cardiac events (0.38 [0.23—0.62], $P = 0.0001$) and after surgery patients with LA-index = 60 ml/m^2 vs. < 60 ml/m^2 did not incur excess mortality or cardiac events (both $P > 0.30$).

Conclusion.— In organic MR, LA-index at diagnosis predicts long-term outcome, incrementally to known predictors of outcome. This novel marker of risk is particularly important because mitral surgery in these patients markedly improves outcome and restores life expectancy. LA-index should be measured in routine clinical practice for risk-stratification and for clinical decision-making in patients with organic MR.

28

Cardiogenic unilateral pulmonary edema and severe mitral regurgitation: Prevalence, characteristics and outcomes

D. Attias, N. Mansencal, B. Auvert, A. Vieillard Baron, A. Delos, P. Lacombe, R. Nguetta, F. Jardin, O. Dubourg
Hôpital Ambroise-Paré, AP—HP, Boulogne, France

Background.— Cardiogenic unilateral pulmonary edema is a rare entity and is often misdiagnosed. The aim of our study was to determine the prevalence of unilateral pulmonary edema and the clinical and echocardiographic characteristics of this particular form of cardiogenic pulmonary edema.

Methods.— This is a retrospective study that enrolled all consecutive patients admitted in the two intensive care units of a French University Hospital for cardiogenic pulmonary edema from January 2000 to May 2008.

Results.— During this period, 869 consecutive patients (475 men, 394 women; mean age 75.4 ± 13.0) were hospitalized for cardiogenic pulmonary edema. Among this population, 18 patients (10 men, 8 women; mean age 76.4 ± 12.9, range 46 to 94 years) presented with radiological features of unilateral pulmonary edema resulting in a prevalence of 2%. The UPE was right-sided in 16 cases and left-sided in 2.

UPE was associated in all cases with severe MR (organic MR in 10 patients and functional MR in 8 patients).

Fifty-three additional patients presented a bilateral pulmonary edema (BPE) associated with severe MR (26 organic MR, 27 functional MR). Clinical and echocardiographic features were similar between patients with UPE or BPE due to severe MR.

In patients presenting with UPE, urgent mitral surgery had to be performed in 5 patients (28%) who presented with organic MR leading to two mitral valve repair and three valvular replacements. There was no difference in the two groups as regards the necessity of urgent mitral surgery (5/18 Vs 12/53, $p = 0.75$).

However, patients with UPE required significantly more use of non-invasive or invasive ventilation ($p = 0.008$) and catecholamines ($p = 0.01$) than patients with classical BPE due to severe MR. Use of antibiotherapy was significantly higher in patients with UPE than in patients with BPE associated with severe MR (61% [11/118] Vs 3/53, $p < 0.0001$). In univariate analysis, mortality was significantly higher in patients with UPE (7/18) than in patients with BPE (3/53) due to severe MR in univariate analysis (OR = 10.6 [95% CI: 2.4—47], $p = 0.0021$) and in multivariate analysis (OR = 8.4 [95% CI: 1.5—47], $p = 0.015$).

Conclusion.— In our study, unilateral pulmonary edema represents 2% of all cardiogenic pulmonary edema and was always associated to unilateral pulmonary edema. Unilateral pulmonary edema appears usually as an opacity involving the right upper lobe. Because of the risk of misdiagnosis (pneumonia, neoplasm), this entity has to be known to avoid delays in treatment that may affect prognosis.

29

Quantification erronée d'une sténose aortique avant chirurgie vasculaire : cas clinique

D. Bouguet[a], S. Ederhy[b], F. Cluzel[a]
[a] CHU Pitié-Salpêtrière, Paris, France ; [b] CHU Saint-Antoine, Paris, France

Monsieur P., 80 ans, porteur d'une sténose aortique dégénérative (RAC) présente une amaurose transitoire en rapport avec une sténose de 80 % de la carotide interne droite. Sa dernière échographie en ville montre : gradient moyen : 50 mmHg, surface aortique : 0,9 cm^2, FEVG : 77 %, HVG à prédominance septale, HOG (26,5 cm^2), IM modérée. Les pressions ne sont pas précisées et l'opérateur utilise la sonde couplée à l'imagerie en décubitus latéral exclusivement. Il signale une discrète accélération sous-aortique. Le cardiologue traitant demande avis auprès d'un chirurgien cardiaque, qui récuse l'intervention. Un chirurgien vasculaire préconise alors une endartériectomie carotidienne droite. Une échocardiographie, pratiquée par un opérateur expérimenté, montre que le RAC est très serré : gradient moyen : 80 mmHg, surface : 0,3 cm^2/m^2, pressions gauches et droites élevées. Une IRM cardiaque montre 2 infarctus sous-endocardiques et une excellente corrélation avec les calculs écho. Un angioscanner de la crosse montre : une aorte ascendante calcifiée sans élément mobile, des lésions coronaires tri-tronculaires très sévères et précise l'anatomie valvulaire, avec une excellente corrélation avec les calculs écho. Une coronarographie détaille ces lésions, 3 stents nus sont posés de façon à diminuer la durée de l'intervention, qui comportera, après 6 semaines de bithérapie anti-plaquettaire : bioprothèse aortique, monopontage IVA mammaire, endartériectomie carotide droite. La sortie de CEC se déroule sans problème, le rythme sinusal est conservé, il sort de réanimation après 48 heures. À un an, son échographie de contrôle montre : gradient moyen : 14 mmHg, surface prothétique : 1,22 cm^2/m^2, pressions normales, diminution de l'HVG et de l'HOG.

Les recommandations actualisées de la SFC rappellent les règles immuables concernant la quantification d'un RAC.

30

Prospectively randomized echocardiographic evaluation of stentless versus stented biological aortic valves with small annulus at one year

P. Maribas, P. Deleuze, O.-M. Bical
Hôpital Saint-Joseph, Paris, France

Objectives.— Stentless bioprostheses (Freestyle) have been proposed as the prosthesis of choice for small aortic annulus in order to improve hemodynamic performance. The technical difficult implantation of stentless limits its use. The Mitroflow pericardial (stented bioprosthesis) has been introduced with excellent hemodynamic performance and an easier implantation technique. The aim of this prospectively randomized study was to compare echocardiographic performances of stentless versus stented aortic valve after aortic valve replacement of small sizes.

Methods.— From April 2006 to April 2007, 41 consecutive patients with aortic valve disease and small annulus were assigned to receive a Medtronic Freestyle valve (stentless group) ($n = 20$) or a Sorin Mitroflow valve (stented group) ($n = 21$) with the same surgeon.

Ninety percent (stentless group) and 80.9% (stented group) of patients had aortic stenosis. Valve size was for stentless group: 19 = 7, 21 = 7, 23 = 6 and for stented group: 19 = 2, 21 = 12, 23 = 7.

There are no significant differences in population: age and sex distribution, preoperative pressure gradients and NYHA functional status.

All patients underwent transthoracic echocardiographic study (TTE) a few days after operation and at 3, 6 and 12 months postoperatively: maximum velocity, maximum and mean transprothetic

gradient, aortic valve area and prosthetic valve regurgitation, wall thickness, LV mass and left ventricular ejection fraction.
Results.— Mean age was 71.9 years for stentless group and 79.5 years for stented group. There was no operative mortality. Two late deaths were not valve related in stented group. There was no difference in immediate postoperative complications. After one year, there was no significant difference for TTE parameters particularly the mean gradient was respectively 12.3 ± 4.4 mmHg for stentless group and 15.6 ± 4.5 mmHg for stented group. No significant aortic insufficiency occurred in stentless group.
Conclusion.— There were no difference in TTE data and outcome of patients with two types of biological valves with and without stent with small annulus at one year. Further follow-up must be performed to prove or no theses results at long term.

31

Usefulness of echocardiography for assessment of carcinoid heart disease during follow-up

N. Mansencal, E. Mitry, J.-B. Bachet, P. Rougier, O. Dubourg
Hôpital Ambroise-Paré, Boulogne, France

Background.— Carcinoid heart disease (CHD) is a rare disease and its prevalence is uncertain. The aim of this prospective study was to assess the prevalence of right-sided and left-sided CHD.
Methods.— We prospectively studied 60 consecutive patients referred to our institution for histologically proven digestive endocrine tumor and carcinoid syndrome. All patients underwent serial conventional transthoracic echocardiographic studies and biological carcinoid markers. Right-sided and left-sided CHD and score of severity of CHD (0—30) were systematically assessed.
Results.— Mean duration of follow-up was 28 months (range, 12 to 60 months). At baseline, prevalence of right-sided and left-sided CHD was 33 and 8%, respectively, whereas at the end of follow-up, this prevalence was respectively 52 and 22% and was similar in the first 30 patients included as compared with the last 30 patients included ($p = 0.80$ and $p = 0.69$ respectively). Mean global score of gravity was 13.1 ± 6.9 in patients with CHD. Correlations were strong between urinary 5-HIAA and right-sided CHD score ($r = 0.72$, $p < 0.0001$), between urinary 5-HIAA and left-sided CHD score ($r = 0.79$, $p = 0.001$) and between urinary 5-HIAA and global CHD score ($r = 0.81$, $p < 0.0001$). All patients with at least 3 years of carcinoid syndrome and increased level of urinary 5-HIAA presented with CHD.
Conclusions.— Prevalence of right-sided CHD remains high and left-sided involvement was observed even more frequently than previously reported. Carcinoid heart disease progresses over time, highlighting the need for echocardiography once the diagnosis of carcinoid syndrome is made.

Stress echo

36

Latent obstruction elicits a rapid proteolysis of von Willebrand factor in patients with hypertrophic cardiomyopathy. A rest and exercise echocardiographic study

T. Le Tourneau[a], A. Polge[a], M. Richardson[a], A. Millaire[a], C. Caron[b], S. Susen[b], J. Goudemand[b], C. Bauters[c], B. Jude[b], G. Deklunder[a]
[a] *Ultrasound Department, Lille, France;* [b] *Hematology, Lille, France;* [c] *Cardiology, Lille, France*

Goals.— Latent obstruction in hypertrophic cardiomyopathy (HCM) is thought to have clinical and prognostic consequences. von Willebrand factor (VWF) is sensitive to high shear stress conditions. Baseline obstruction impairs VWF in HCM. Whether latent obstruction induces early biological alterations after exercise is unknown. We sought to assess the acute effect of exercise-induced obstruction on VWF in patients with latent obstruction, and the determinants of obstruction and VWF impairment.
Materials and methods.— A comprehensive echocardiography was performed at rest and during exercise in 32 patients with HCM. Sixteen patients (44 ± 16 years, 14 males) with latent obstruction (baseline peak gradient < 30 mmHg and exercise peak gradient = 30 mmHg) were matched with 16 patients without obstruction. The type and duration of obstruction during exercise and recovery were characterized by an obstruction score, with 1 when maximum peak gradient was recorded during exercise, 2 when peak gradient further increased after exercise but decreased before the third minute of recovery, and 3 when obstruction persisted beyond the third minute of recovery. Blood was sampled before and after exercise to assess VWF.
Results.— Baseline median [25—75th percentiles] peak gradient was 8 [6—11] mmHg, and rose up to 32 [17—104] mmHg with exercise. By multivariate linear regression analysis (R^2 of the model 0.66) baseline predictors of exercise-induced obstruction were incomplete systolic anterior motion of the mitral valve (SAM) ($r = 0.76$, $p < 0.0001$) and lateral mitral annulus S velocity ($r = 0.34$, $p = 0.004$). At rest, VWF function was modestly impaired in patients with latent obstruction. VWF-collagen binding activity to antigen ratio (VWF: CB/Ag) and the percentage of high molecular weight multimers of VWF (%HMWM) did not change after exercise in the non obstructive group but were lowered in patients with latent obstruction (both $p = 0.003$). Incomplete SAM at rest was the strongest independent predictor of %HMWM drop ($r = -0.70$, $p < 0.0001$). %HMWM after exercise tightly correlated with exercise peak gradient ($r = -0.78$, $p < 0.0001$) and the persistence of obstruction during recovery ($r = -0.67$, $p = 0.005$).
Conclusion.— Incomplete SAM and mitral S velocity at rest are the main predictors of obstruction during exercise in patients with HCM. Latent obstruction has significant biological effect in these patients, with a rapid cleavage of the largest multimers of VWF. Multimers proteolysis is related not only to the magnitude of peak gradient or shear stress during exercise but also to the persistence of obstruction during recovery.

37

Longitudinal myocardial function and exercise

F. Schnell, E. Donal, A. Bernard, R. Ollivier, C. De Place, F. Carr
Cardiologie, CHU de Rennes, Rennes, France

Background.— Despite the amount of work performed to-date, differentiation of pathologic from physiologic left ventricular (LV) hypertrophy might remain challenging.
Purpose.— We sought to evaluate the usefulness of 2D-strain echocardiography at rest and during exercise to differentiate these two different kinds of LV-remodelling.
Methods.— This prospective study included 17 healthy sedentary control subjects and 36 subjects with a LV-hypertrophy (H): 10 elite athletes (kayakers), 10 patients with primitive hypertrophic cardiomyopathy, 6 patients with LVH exclusively due to hypertension, and 10 patients with LVH and asymptomatic severe aortic stenosis. Each was investigated according to the same standardized protocol of exercise-echocardiography.
Results.— LV-ejection fraction did not differentiate the different groups. Among parameters of deformation at rest, significant differences were found between physiologic and pathologic hypertrophy but with an overlap between groups. The exercise emphasized these differences: S', mean longitudinal and radial strains, mean circum-

ferential strain and were significantly different between types of LVH. According to the ROC-analysis, exercise longitudinal strain, especially septal one provided a discriminative cut-off according to the LVH etiology.
Conclusion.— We demonstrated for the first time the usefulness of exercise deformation—echocardiography in differentiating physiologic from pathologic hypertrophy.

38

Functional mitral regurgitation at rest may be an important determinant of the response to cardiac resynchronization therapy during exercise in patients with chronic heart failure due to left ventricular systolic dysfunction

S.M. Marechaux[a], T.L.T. Le Tourneau[a], P.V.E. Ennezat[a], C.P. Pinã§on[b], B.G. Gal[a], C.K. Kouakam[a], C.M. Marquie[a], F.M. Mouquet[a], S.D. Dennetiere[c], Y.G. Guyomar[d], A.C.S. Cohen Solal[e], D.L. Logeart[e], P.A. Asseman[a], P.D.G. De Groote[a]
[a] *Hôpital cardiologique, 59037 Lille cedex, France ;* [b] *faculté de pharmacie, Lille, France ;* [c] *centre hospitalier de Roubaix, Roubaix, France ;* [d] *hôpital Saint-Philibert, Lomme, France ;* [e] *hôpital Beaujon, Paris, France*

Background.— Cardiac resynchronization therapy (CRT) increases forward stroke volume (FSV) and cardiac output during dynamic exercise in patients with chronic heart failure (CHF) and functional mitral regurgitation (MR) at rest. Whether CRT increases FSV and cardiac output in CHF patients who do not have functional MR at rest remains unknown.
Methods.— Fifteen patients with CHF due to left ventricular (LV) systolic dysfunction who had recently undergone CRT and had not MR at rest performed 2 symptoms limited exercise test with continuous Doppler echocardiography monitoring. The first test was performed with CRT on and the second with CRT off. Twenty-six patients with CHF due to LV systolic dysfunction and functional MR at baseline served as controls.
Results.— During dynamic exercise, changes in mitral ERO were reduced by CRT ($8 \pm 7\,mm^2$ vs $1 \pm 4\,mm^2$, $P < 0.00001$). In patients with functional MR at rest, exercise induced changes in FSV were greater with CRT on than CRT off (4 ± 8 mL vs -2 ± 7 mL, $P = 0.0002$) while CRT did not significantly affect exercise induced changes in FSV in patients without MR at rest. Similarly, exercise induced changes in cardiac output were greater with CRT on than CRT off (1.6 ± 1.2 L/min vs 1.1 ± 1.2 L/min, $P = 0.002$) in patients with functional MR at rest while exercise induced changes in cardiac output were similar with CRT on and CRT off in patients without MR at rest.
Conclusions.— The contrasting hemodynamic effects of CRT during dynamic exercise in CHF patients with and without functional MR underline the important role of functional MR in the response to CRT during dynamic exercise.

39

How to improve diagnosis of ischemia using stress echo? The ''Chauber'' sign

L. Renaud, C. Chauvel, C. Attane, P. Dehant, M. Simon, E. Bogino, M. Jimenez, E. Abergel
Clinique Saint-Augustin, Bordeaux, France

Background and objectives.— Worsening of wall motion (WM) in at least 2 consecutive left ventricular (LV) segments is the main criteria for diagnosing ischemia during stress echocardiography. This approach is subjective, the learning curve is long and the diagnostic value is not always satisfactory, particularly for circumflex artery (Cx) stenosis. In patients with Cx stenosis, we observed that apical WM abnormality is often trivial but an abnormal motion of the apex was not rare. Our aim was to evaluate the feasibility and the diagnostic value of a new diagnosis sign, called ''Chauber''.
Methods.— Seventy-eight consecutive patients were included if they fulfill the following criteria: (1) indication for stress echo to detect ischemia; (2) normal LV function at rest; (3) coronary angiography requested by the cardiologist performing the test and/or the referent cardiologist. Stress echo were blindly analyzed by 3 independent readers: 2 seniors (S1 and S2) and 1 junior (J1) cardiologists. ''Chauber'' was defined as a rise of the apical lateral wall and/or an horizontal displacement of the apex toward the septum, in 4 chamber view at peak stress. Before the protocol, J1 was educated during 15 minutes on the basis of 5 cases with ''Chauber''. Significant coronary artery stenosis was defined as a maximal lumen diameter stenosis of > 50% at angiography.
Results.— Fifty-two exercises and 26 dobutamine were performed. Mean age was 64.6 ± 10.3 years, peak heart rate (HR) was $89.6 \pm 12\%$ of the maximal predictive HR and systolic blood pressure at peak stress was 195 ± 36 mmHg. Significant coronary stenosis was found in 63 patients (81%). Agreement for presence of ''Chauber'' was very good between S1 and S2 (kappa = 0.90) and good between S1 and J1 (kappa = 0.74) and S2 and J1 (kappa = 0.76). Sensitivity (Se), specificity (Sp), positive predictive value (PPV) and negative predictive value (NPV) of ''Chauber'' to detect coronary stenosis were respectively for S1: Se: 32%, Sp: 87%, PPV: 91%, NPV: 23%; for S2: Se: 33%, Sp: 87%, PPV: 91%, NPV: 24%; for J1: Se: 24%, Sp: 87%, PPV: 88%, NPV: 21%. Diagnostic value of ''Chauber'' to predict circumflex stenosis (single or multivessel stenosis) was also evaluated; for S1 and S2 (same values), Se: 52%, Sp: 89%, PPV: 77%, NPV: 71%; for J1: Se: 36%, Sp: 89%, PPV: 71%, NPV: 66%.
Conclusion.— With a short learning curve, ''Chauber'' is easily diagnosed with a very good interobserver agreement. It has a high Sp and a high PPV for both diagnosis of ischemia and Cx stenosis, during exercise or dobutamine echo.

401

Pression artérielle pulmonaire au repos et à l'effort chez l'insuffisant cardiaque : déterminants et comparaison avec le sujet normal

J.-P. Quéré[a], A. De Lavernhe[a], M. Cassol[b], H. Majoub[a], C. Tribouilloy[a]
[a] *CHU d'Amiens, Amiens, France ;* [b] *centre hospitalier de Corbie, Corbie, France*

Objectifs.— Comparer l'évolution de la pression artérielle pulmonaire systolique (PAPs) à l'effort chez l'insuffisant cardiaque et chez le sujet sain ; identifier les déterminants de la PAPs de repos et d'effort chez l'insuffisant cardiaque.
Matériels et méthodes.— Quarante-quatre insuffisants cardiaques (IC) avec fraction d'éjection ventriculaire gauche par Simpson (FEVG) < 40 % et 25 sujets normaux (SN) dont la PAPs était mesurable au repos ont réalisé un test d'effort sur cyclo-ergométre. Les groupes étaient comparables pour l'âge et le sexe (57 ± 11 et 58 ± 9 ans, $p = 0,67$; 25 % et 24 % de femmes, $p = 0,78$).
L'insuffisance cardiaque était d'origine non ischémique chez 36 patients. On a étudié au repos et au pic de l'effort (changement = ?) : la FEVG, la fréquence cardiaque, le volume d'éjection Doppler (VES), le débit cardiaque, la PAPs, ainsi que, chez les IC : le rapport E/Ea latéral, la fraction systolique du flux veineux pulmonaire (FS), la surface de l'orifice régurgitant (SOR) de l'insuffisance mitrale (IM), ainsi que la fraction d'éjection du ventricule droit au repos (FEVD).
Résultats.— Au repos, tous les paramètres prévus ont été mesurés. À l'effort, chez les SN : FEVG et VES ont toujours été mesurés ; la PAPs a été mesurée 23 fois ; chez les IC : FEVG, VES, SOR, PAPs, E/Ea et FS ont été mesurés respectivement 44, 44, 44, 29,26 et 28 fois.
Au repos chez les IC PAPs était plus élevée que chez les SN (32 ± 7 mmHg vs 28 ± 4 mmHg ; $p = 0,001$) ; l'IM était minime

(SOR = 0,06 ± 0,06 cm^2) et les paramètres corrélés à la PAPs étaient FS ($r = -0,38$; $p = 0,01$) et FEVD ($r = -0,52$; $p = 0,003$).
À l'effort, sur l'ensemble de la population, ?PAPs était corrélée à ?DC ($r = 0,58$; $p < 0,0005$) ; PAPs augmentait moins chez les IC (32 ± 7—46 ± 13 mmHg ; ?PAPs = 14 ± 13 mmHg,) que chez les SN (28 ± 4—58 ± 7 mmHg ; ?PAPs = 30 ± 7 mmHg ; $p < 0,0005$) versus IC, dont le QC augmentait davantage (?QC = 8,9 ± 3,3 l/min vs 2,7 ± 2,3 l/min ; $p < 0,0005$). Chez les IC, la SOR variait peu (?SOR = 0,01 ± 0,06 cm^2 ; $p = 0,16$) et les paramètres corrélés à ?PAPs étaient ?FS ($r = -0,65$; $p = 0,002$), ?E/Ea ($r = 0,61$; $p = 0,007$) et FEVD ($r = 0,61$; $p = 0,003$).
Conclusion.— Chez l'insuffisant cardiaque, l'hypertension pulmonaire de repos est associée à une dysfonction VD. En l'absence d'IM notable, les indices de pression de remplissage VG prédisent (pour FS) la PAPs de repos ; leurs changements (?FS et ?E/Ea) prédisent l'augmentation de la PAPs à l'effort. Celle-ci dépend également de la fonction VD. La PAPs augmente moins à l'effort que chez les SN.

41

L'échocardiographie d'effort permet-elle de prédire l'évolution de la fraction d'éjection ventriculaire gauche sous traitement médical dans l'insuffisance cardiaque systolique ?

A. De Lavernhe[a], J.-P. Quéré[a], H. Majoub[a], M. Cassol[b], C. Tribouilloy[a]
[a] *CHU d'Amiens, Amiens, France ;* [b] *centre hospitalier de Corbie, Corbie, France*

Objectifs.— Comparer par échographie cardiaque la réponse à l'effort des insuffisants cardiaques et des sujets sains ; déterminer si certains paramètres échographiques d'effort prédisent l'évolution de la fraction d'éjection ventriculaire gauche au cours du suivi.
Matériels et méthodes.— Vingt-neuf patients (P) présentant une insuffisance cardiaque non ischémique avec fraction d'éjection ventriculaire gauche inférieure à 40 % (FEVG moyenne = 27 ± 9 %) découverte depuis moins de 3 mois ont réalisé une échographie cardiaque d'effort sur table cyclo-ergométrique. Vingt-cinq sujets normaux (SN) ont effectué le même test.
On a mesuré par méthode de Simpson (apicale 4 cavités) les variations entre repos et pic de l'effort des volumes ventriculaires gauches télédiastolique et télésystolique indexés à la surface corporelle (?VTDi, ?VTSi) par méthode de Simpson (biplan) la variation de la fraction d'éjection ventriculaire gauche (?FEVG) et en Doppler pulsé les variations du volume d'éjection systolique indexé (?VESi) et de l'index cardiaque (?IC).
Résultats.— Les ?FEVG, les ?VTDi et les ?VTSi ont pu être mesurés chez les 25 SN et chez 26 P. Les ?VESi et les ?IC ont pu être mesurés chez tous. Au cours du suivi, un patient a été perdu de vue.
Chez les normaux, la FEVG, le VESi et l'IC augmentaient nettement à l'effort (?FE = 7,3 ± 9,3 %, $p = 0,001$; ?VESi = 11,5 ± 4,0 ml/m2, $p < 0,0005$; ?IC = 4,5 ± 1,6 ml/m^2, $p < 0,0005$) versus repos ; chez les P, ces augmentations étaient moindres (?FE = 3,9 ± 5,7 %, $p = 0,13$; ?VESi = 5,3 ± 7,6 ml/m^2, $p = 0,001$, ?IC 1,7 ± 1,3 ml/m^2, $p < 0,0005$) versus SN. Chez les normaux, VTSi diminuait à l'effort (?VTSi = − 3 ± 6 ml/m^2, $p = 0,008$) versus repos ; chez les P, il diminuait moins (?VTSi = − 1 ± 14 ml/m^2, $p = 0,59$) versus repos et de façon plus variable d'un sujet à l'autre ($p < 0,005$ versus SN pour le test de Levene).
Sur un suivi moyen de 11 ± 7 mois, la FEVG des insuffisants cardiaques augmentait de 11 ± 11 %. L'amélioration de FEVG au cours du suivi tendait à être corrélée à ?FEVG à l'effort ($r = 0,36$; $p = 0,07$) et était corrélée au ?VTSi à l'effort ($r = -0,53$; $p = 0,005$).
Conclusion.— Lors de l'échocardiographie à l'effort chez l'insuffisant cardiaque systolique non ischémique, la FEVG augmente moins que chez le SN ; l'amélioration de la FEVG au cours du suivi est reliée à la diminution du volume télésystolique VG à l'effort.

42

Stress echocardiography using dobutamine or milrinone may help to identify left ventricular dyssynchrony

J.-L. Philip, J.-C. Eicher, O. Barthez, J.-E. Wolf
Centre de cardiologie, hôpital Bocage, Dijon, France

Background.— At least 1/3 of patients selected for cardiac resynchonization therapy upon electrocardiographic criteria are non responders. Echo-Doppler criteria evaluated in the PROSPECT study did not provide additional predictive value for clinical improvement, mainly because of important interobserver variability. This may be explained by the difficulties of measuring mechanical phenomena of very low amplitude due to the underlying disease. Stress echocardiography could be helpful by amplifying myocardial movements.
Aims.— (1) To evaluate the effects of inotropic stimulation on echo-Doppler criteria of LV dyssynchrony. (2) To compare dobutamine and milrinone in patients taking beta-blockers.
Methods.— Ten patients with non ischemic dilated cardiomyopathy and left bundle-branch block underwent 2 stress echocardiographies, one with dobutamine (D: 5—20 μg/kg per minute in 5 min dose increments), one with milrinone (M: 5 μg/kg per minute during 10 min) with an interval of 1 to 15 days. The following parameters were measured at baseline and at the end of the infusion protocol: septum to posterior wall motion delay (SPWMD), aortic pre-ejection period, aortic VTI, diastolic filling time, maximum amplitude of S-wave (maxS) on DTI at the mitral annulus (6-segment model), maximum difference between electro-mechanical delays at the mitral annulus (maxD), left ventricular ejection fraction (LVEF), max dP/dt. Tolerance was studied by recording arterial pressure, heart rate, rhythm and symptoms.
Results.— MaxS increased significantly both on D and M at all segments except for antero-septal. Asynchrony criteria did not change significantly, but measurements of SPWMD and electro-mechanical delays were easier under inotropes. LVEF increased significantly but slightly from 15.6 ± 4.9 to 16.6 ± 7.8%, aortic VTI increased nonsignificantly from 22.11 ± 4.3 to 25.96 ± 4.9 cm. No significant difference was found between D and M, but there was a trend toward a better response with D (maybe because only half of the patients had > 50% of the target dose of beta-blockers). Tolerance was excellent with both protocols, but heart rate and VPC frequency were higher with D.
Conclusion.— (1) Stress echo appears to be interesting in the assessment of asynchrony in patients with very severely depressed LV function, by facilitating measurement of regional mechanical phenomena. (2) Global LV function do not seems to be improved by inotropic stimulation and stress echo may fail to assess contractile reserve in patients with severe asynchrony. Use of milrinone appears to be safe and easier compared to dobutamine in patients taking beta-blockers.

43

Does cardiac risk stratification by dobutamine stress echocardiography before major vascular surgery enhance prognosis?

O. Aitmokhtar[a], K. Aissi[b], M. Bouffi[c], Y. Alimi[c], F. Paganelli[a]
[a] *Cardiologie, hôpital Nord, Marseille, France ;* [b] *médecine interne, hôpital Nord, Marseille, France ;* [c] *chirurgie vasculaire, hôpital Nord, Marseille, France*

Background.— Cardiac risk stratification by dobutamin stress echocardiography (DSE) before major vascular surgery is warranted

in high clinical risk patients. In intermediate and low clinical risk patients the place of DSE to guide introduction of beta-blockers (BB) is not clear.

Aims.— To compare the incidence of major cardiovascular events (MACE) after abdominal aortic surgery in patients evaluated by DSE and patients evaluated by clinical risk only.

Materials and methods.— Between 2003 and 2008, 109 patients were scheduled for abdominal aortic surgery, 79 unselected patients were included; 42 patients were evaluated by DSE (group 1) and 37 were evaluated clinically only (group 2). Patients who had induced ischemia by DSE were treated by BB.

Results.— Clinical characteristics were similar in the two groups, excepted for BB (50% vs. 24%, $p = 0.02$) and heart rate (68.8 ± 10 bpm vs. 74.8 ± 11 bpm, $p = 0.01$). At one month, the MACE comporting: cardiovascular (CV) death, myocardial infarction (MI), heart failure (HF), arrhythmia and myocardial damage was similar in the two groups (19% vs. 18.9% $p = 0.80$), the rate of CV death, MI, heart failure, arrhythmia and myocardial damage were (2.3% vs. 2.7%, $p = 0.79$; 7.1% vs. 5.4%, $p = 0.62$; 0% vs. 2.7%, $p = 0.74$; 4.7% vs. 5.4%, $p = 0.81$; 9.5% vs. 8.1%, $p = 0.82$) respectively. In group 1 the rate of MACE according to the results of DSE were: 75% in high positive test, 16.6% in low positive test and 3.6% in negative test. On patients under BB the incidence of MACE was similar to patients without BB (20% vs. 18.3%, $p = 0.56$) despite a significant lower heart rate (68.1 ± 11.1 bpm vs. 73.8 ± 10.7 bpm, $p = 0.03$).

Conclusion.— Cardiovascular complications are high after major vascular surgery, particularly in patients with large induced ischemia by DSE despite treatment by BB. The practice of DSE before major vascular surgery to guide BB administration was not associated with better prognosis.